Mapping the Ecologies of the Dutch Energy Transition Hyperlink Network

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Published in:
Complex Networks 2019

Publication date:
2019

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1 Introduction

Internet facilitates connections between a range of actors with a stake in the energy transition, including governments, environmental organizations, media outlets and corporations [1,2]. These connections tease a hyperlink network [3,4] affecting public's access to the information on energy transition issues. Despite its societal relevance, however, the characteristics of this network remain understudied. We present the results of a methodology we developed to study the Dutch energy transition hyperlink network. Our data shows the existence of a highly centralized network -with few authorities [5]- in which the debate about the energy transition revolves around a reduced number of topics.

2 Results

Figure 1 shows the methodology we developed to study the ecologies of the Dutch energy transition hyperlink network. To build the network we employed the Issue Crawler [6] and longitudinally collected data (February-May 2019) from the interactions (hyperlinks) between 9 websites representing key Dutch actors (public institutions, private companies, media, etc) with a stake in the energy transition debate (Phase 1). Then all the references to the "energy transition" debate were extracted from the nodes' websites (N= 2,042) and (when possible) from its related Twitter accounts (Phase 2). Next, we collected data on the nodes' location and aggregated all the nodes' texts (website and tweets) into a single corpus (Phase 3). Last, we carried out our social network and topic modelling (Factor Analysis) analyses (Phase 4).

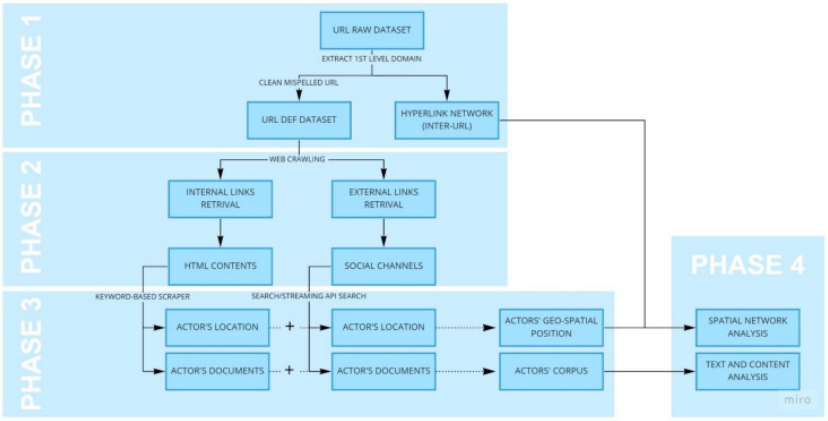

Fig. 1. A new methodology to study the Dutch energy transition hyperlink network

Our results show the existence of a highly centralized network (with the nodes' degree fitting the power law distribution) in which few authorities concentrate most of the communication flows (see Figure 2). Of relevance, it is the leading role played in the network by some private companies (e.g. Siemens), public institutions (e.g.Netherlands Organization for Scientific Research -NWO-) and civil society organizations (e.g. Netherlands Wind Energy Association -NWEA-).

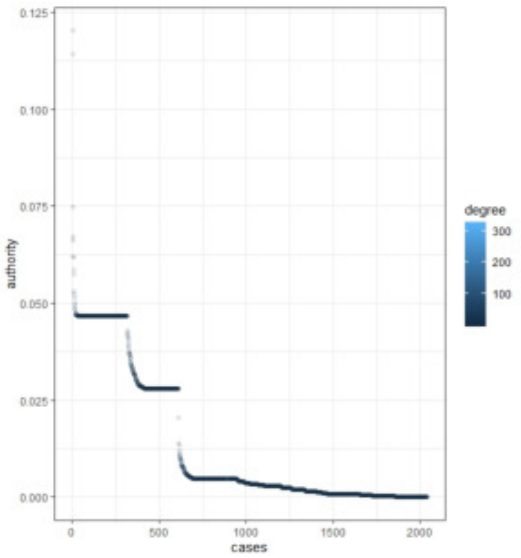

Fig. 2. Distribution of the communication flows in the Dutch energy transition hyperlink network. The chart shows that the degree distribution and the authorities distribution fit the power law.

Moreover, the results of our topic model reveal the existence of a reduced number of topics in the Dutch energy transition hyperlink network (see Figure 3).

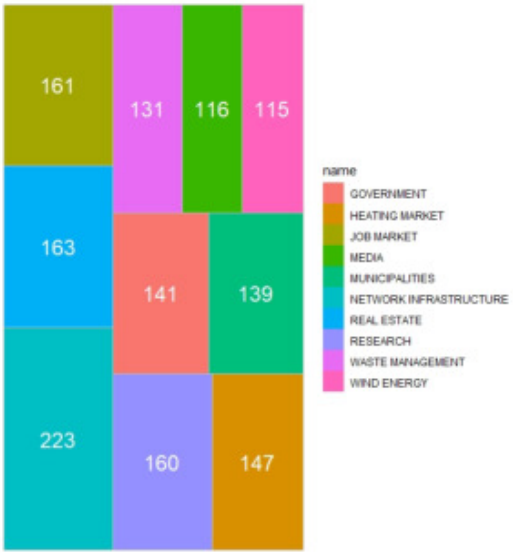

Fig. 3. Results of the topic model. The size of the squares indicates the number of terms allocated to each topic. Before cleaning the textual data, the corpus was of 116 documents and 11,727 unique words. Stop-words and terms with f< 5 were excluded of the analysis, resulting in a corpus of 116 documents and 746 unique words.

Particularly, Figure 3 shows the leading role of the "Network Infrastructure" (N= 223) topic in the Dutch energy transition hyperlink network, followed by a set of topics related to the private sector, ("Real Estate"; "Job Market"; and "Heating Market"). A second group of topics are those related to the role of the Dutch national government and municipalities in the energy transition ("Government" and "Municipalities"). Lastly, our model reveals the existence of three discussion topics linked to media outlets ("Media"), waste management ("Waste Management") and wind energy ("Wind Eenergy").
All in all, these findings reveal the existence of a Dutch energy transition hyperlink network in which few actors dominate the communication flows. Moreover, these communication flows revolve around a specific set of topics which seem to be led by market-oriented interests.

Summary. We have mapped the ecologies of the Dutch energy transition hyperlink network. Our results reveal the existence of a highly centralized network in which few authorities concentrate most of the communication flows. Indeed, the results of our topic model show the presence of a limited number of discussion topics.

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